

Role of Cardiac Evaluation in Young Competitive Athletes with Physiological Hypertrophic Cardiomyopathy and Bradycardia: Analytical Review

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Abstract

Background: Athletes hearts are generally larger and stronger than those of non-athletes due to their physical demand Cardiomyopathy of their sports. This is due to physiological adaptation to regular intense exercise. Hypertrophic cardiomyopathy (HCM) is a cardiac disorder characterized by thickening of the heart muscle, which can lead to heart failure, arrhythmias, and sudden cardiac death. Athletes with HCM may be at increased risk of adverse cardiac events due to the combination of exercise-induced changes in heart function and the underlying cardiac abnormalities. Bradycardia typically is a heart rate of less than 60 beats per minute. Athletes may develop bradycardia as a result of their training, adaptation of the heart in response to regular physical activity" commonly known as athlete's heart."Athletes with HCM develop an enlarged heart, which can be mistaken for" athlete's heart.

Objectives: To provide an overview of the prevalence, diagnosis, and management of HCM in athletes.

Method: A case study of 25-year-old who presented with shortness of breath, chest pains, and palpitations on exertion. He had an electrocardiogram and echocardiogram with features of HCM; however, the LV diastolic function was normal and cardiopulmonary exercise testing revealed high peak oxygen consumption in keeping it with a physiological left ventricular hypertrophy.

Lifestyle modifications, by reducing the intensity of exercise to help manage symptoms and minimize the risk of complications were implemented. Medications to improve heart function. With these, there was a complete change on his ECG and Echocardiography, thereafter indicating a physiological LVH rather than HCM.

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Conclusion: HCM is the most common cause of sudden cardiac death (SCD) in young athletes, accounting for up to 36% of cases. Prevalence of HCM in athletes is estimated to be around 0.2%, which is higher than that in the general population. Not all athletes with HCM are at equal risk of SCD, and risk stratification is an essential part of management.

Keywords: Hypertrophic Cardiomyopathy; Bradycardia; Athlete Cardiac Screening.

INTRODUCTION

Left Ventricular Hypertrophy is a physiological adaptation helping athletes perform physical task better than non-athletes. During aerobic exercise which is isotonic the heart rate and stroke volume increases. Systemic vascular resistance falls. A moderate increase in blood pressure can occur due to the increase in cardiac output. A high-volume overload situation may lead to left ventricle eccentric hypertrophy with enlargement of cavity and proportionate increase in wall thickness.¹

Isometric exercise or weight training on the other hand causes only slight increase in cardiac output due to increase in heart rate. But there is significant rise in blood pressure leading to pressure overload to the left ventricle, this causes concentric left ventricular hypertrophy, increase in wall thickness, without much increase in cavity size. This adaptation tends to normalize left ventricular wall stress. In a high dynamic and high static demands

the hypertrophy is mixed and balanced viz in cycling.^{2,3}

MATERIALS & METHODS

25-year-old male who presented with palpitations, chest pains, and shortness of breath on exertion. exertion, with a blood pressure of 100/60mmHg and heart rate of 55 beats per minute. He has no familial history of cardiac disease, sudden cardiac disease, hypertension or diabetes mellitus. No history of smoking or taking alcohol. The patient underwent a thorough evaluation, which revealed a systolic murmur at the lower left sternal border. ECG and ECHO revealed evidence of sinus bradycardia with heart rate of 45bpm with left ventricular hypertrophy. hypertrophy versus hypertrophic cardiomyopathy. He was recommended for a lifestyle modification, including reducing the intensity and duration of his physical activity. The patient was advised to undergo regular follow up in the clinic to monitor his well being.

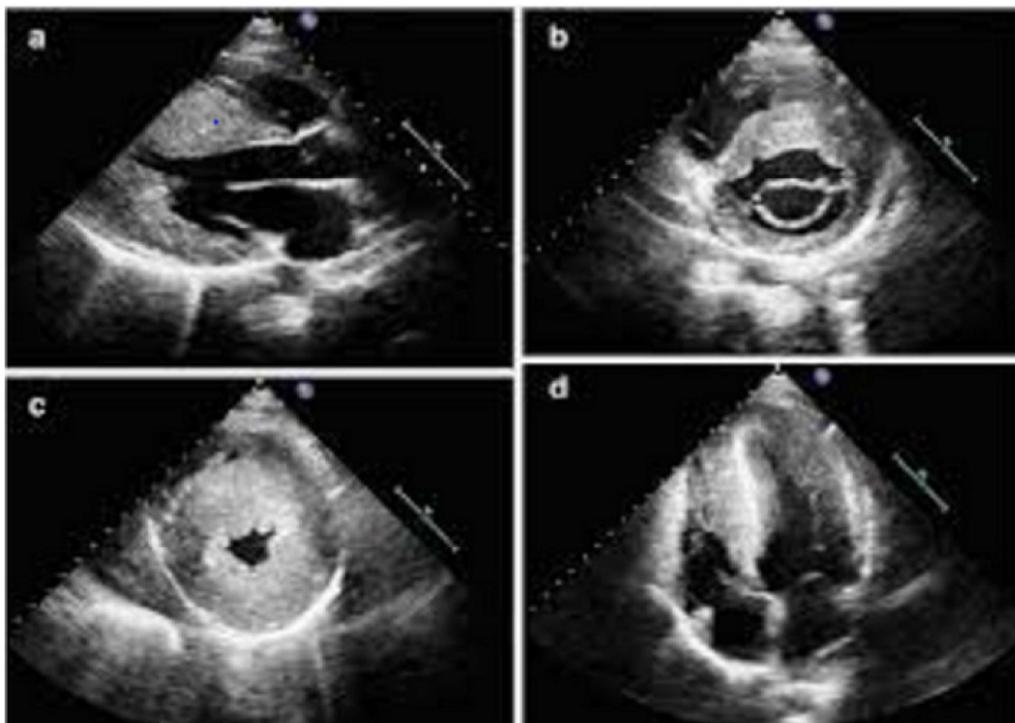


Fig. 1: Transthoracic echocardiography showing hypertrophic cardiomyopathy



Fig. 2: Electrocardiography before showing left ventricular hypertrophy

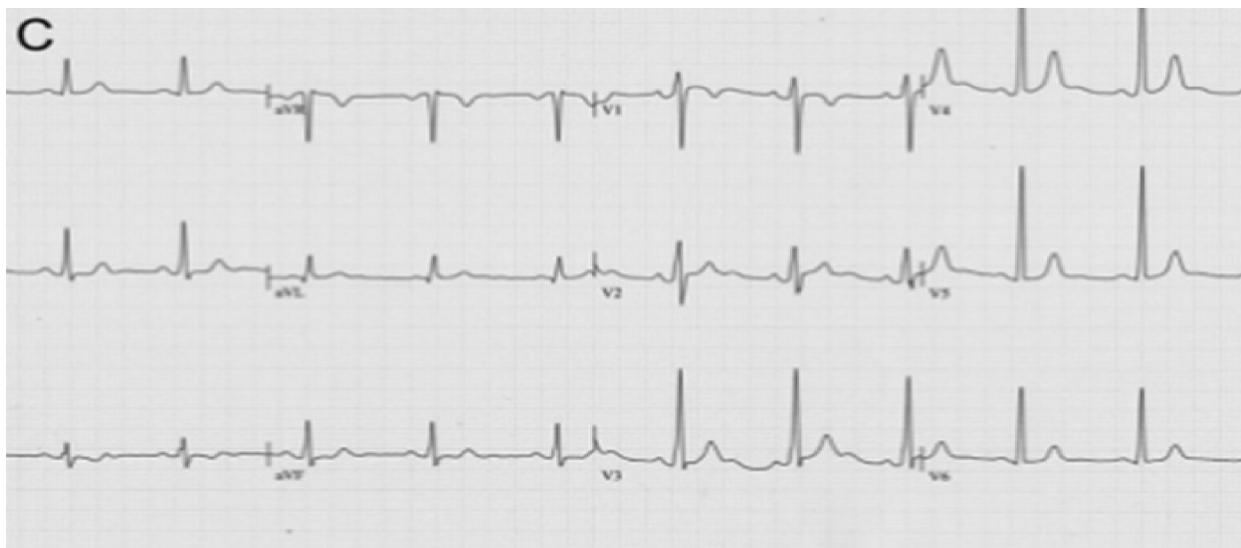


Fig. 3: Electrocardiography showing reduced left ventricular hypertrophy after 3 months of detraining

DISCUSSION

Bradycardia is a condition where an individual has a heart rate that is slower than normal (60 beats per minute). In athletes, bradycardia is often a physiological adaptation to a regular intense exercise and is considered a normal finding in many athletic individuals.³ It is due to increase in parasympathetic tone and decrease in sympathetic tone. Professional athletes can have a lower resting heart rate and improved blood flow. In some cases,

bradycardia can be a sign of underlying heart disease, such as heart block or sick sinus syndrome. It is important for athletes with bradycardia to undergo further evaluation to determine the cause of their condition and determine if treatment is necessary.⁴

Hypertrophic cardiomyopathy is a form of a heart condition that affects the athletes and non-athletes, is characterized by thickening of the heart muscle, leading to an obstruction of normal blood flow.

HCM can be inherited and athletes who have familial history of the condition are at increased

risk. Athletes with HCM also have increased risk of arrhythmias which can lead to sudden cardiac arrest⁵.

The decision to allow athlete with HCM to participate in sports must be made on an individual basis, taking into account factors such as severity of the condition, the athletes age and level of competition and type of sport involved. As per the severity, may be necessary to restrict or even prohibit participation in certain sports.

CONCLUSION

Athletes with hypertrophic cardiomyopathy and bradycardia would provide valuable insights into the diagnosis, management, and impact of these conditions on athletic performance. It would also help raise awareness of the importance of regular cardiac screening and monitoring in athletes to detect potential issues early and prevent complications.

It is important for athletes with HCM and bradycardia to work closely with their healthcare providers to develop an individualized treatment plan that addresses their specific needs and goals. Regular cardiac screening and monitoring are also important to detect any potential risks and to ensure that the athlete's treatment plan. With proper management and treatment, athletes with HCM and bradycardia can continue to train and compete

safely while minimizing their risk of complications.

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